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APPLICATION
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For: METHOD AND SYSTEM FOR FORMING
      DYNAMIC VENDOR COALITIONS IN
      COLLABORATIVE e-COMMERCE
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METHOD AND SYSTEM FOR FORMING DYNAMIC VENDOR COALITIONS IN COLLABORATIVE e-COMMERCE

DESCRIPTION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to electronic marketplaces (e.g., e-commerce) where buyer requirements cannot be met completely by any single vendor and, more particularly, to a method and system for forming dynamic vendor coalitions to deliver the customer requirements jointly.

Background Description

In today's dynamic net-generation business environment, the window of opportunity is shrinking for many businesses due to the time and space compression effect of the Internet. In the face of intense competition, businesses are faced with the need to rapidly re-configure themselves over and over again as they strive to introduce new products and processes. Many businesses find that they are unable to fully respond to demands of the marketplace because of limited capabilities, limited capacity, range of products, location or other limitation. Such businesses may, however, be fully capable of responding at least partially to the demands and would like to participate in a response if they could find a suitable partner or partners.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a way for multiple businesses to effectively respond to demands of the marketplace in a way that allows businesses to remain competitive without the need to rapidly re-configure themselves..

According to the invention, there is provided an alternative to business re-configuration, namely formation of dynamic alliances. Dynamic networks of alliances (or coalitions) are formed between vendors with complementary capabilities to jointly pursue specific market opportunities. Such alliances are created primarily for the purpose of satisfying a market opportunity and disbanded after the opportunity has been satisfied. Although most alliances will be short-term in nature, traditional long-term business relationships can also evolve in some cases.

The invention is a process and a system for forming dynamic vendor coalitions from a pre-qualified set of vendors. It is assumed that the input for vendor coalition formation is a pre-qualified set of vendors generated by other matchmaking and filtering processes. Forming vendor coalitions involves multi-objective optimization, where the objectives might conflict with each other. Examples of such multiple objectives include:

1.   Meeting customer requirements at lowest cost;

2.   Delivering customer requirements in the shortest possible time;

3.   Forming coalitions that have the highest group dynamic coefficient; and

4.   Meeting customer requirements using vendors from a specific region.

This invention can be used in electronic marketplaces where buyer requirements cannot be met completely by any single vendor. In such a case a coalition of vendors can be formed to deliver the customer requirements by

YOR9-2000-0574US1

jointly leveraging the capabilities of individual vendors. Such requirements are common in project-oriented industries where development of engineered-to-order products and services is quite usual. Here a system integrator works with vendors specializing in various capabilities and puts together a proposal

5   for the customer. Another potential area for use of this invention would be for new product or new service introduction (NPI) into a market, irrespective of industry. Here a company with an idea can rapidly assemble a team of specialists to convert the idea into reality. The NPI process again usually tends to be very project-oriented in nature.

10   **BRIEF DESCRIPTION OF THE DRAWINGS**

The foregoing and other objects, aspects and advantages will be better understood from the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

Figure 1 is a block diagram illustrating the vendor coalition formation

15   and selection process;

Figure 2 is a block diagram illustrating vendor coalition formation in a multi-level RFP tree;

Figure 3 is a block diagram which shows in more detail the system-supported coalition formulation process according to the invention;

20   Figure 4 is a block diagram illustrating project decomposition into sub-projects at several levels;

Figure 5 is a block diagram showing RFP transmission from a customer to vendors;

Figure 6 is a block diagram illustrating the process of splitting a RFP

25   into sub-RFPs;

Figure 7 is a block diagram showing an example of primary vendor selection for sub-RFPs by Vendor (2) based on vendor responses (proposals)

YOR9-2000-0574US1

to sub-RFPs; and

Figure 8 is a block diagram showing the response of Vendor (2) to the customer on behalf of coalition C2.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

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Referring now to the drawings, and more particularly to Figure 1, there is shown an overview of the single-level, vendor coalition formation problem between a customer and several vendors. An incoming buyer request, or request for proposal (RFP), is converted into a set of demanded capabilities

10   DC1, DC2, . . ., DCN through capability translation 101. Demanded capabilities (DC) are those that are necessary to address the requirements presented in the RFP and provided by one or more vendors. For each demanded capability, a set of potential vendors is selected through vendor matchmaking functions 102_1, 102_2, . . ., 102_N to whom invitations can be sent

15   out. Thus, for example, the vendor matchmaking function 102_1 generates a set of vendors 103_1 which includes vendors V1, V2 and V3, the vendor matchmaking function 102_2 generates a set of vendors 103_2 which includes vendors V1, V3 and V4, and the vendor matchmaking function 102_3 generates a set of vendors 103_3 which includes vendors V5 and V6. The coalition

20   formation process determines one or more coalition alternates 104_1, 104_2, etc. from which an optimal group of vendors 105 for each of the demanded capabilities is determined.

There are a few points to observe regarding this process:

1.   Each demanded capability in the set DC1, DC2, . . ., DCN will have a

25   shortlist of selected vendors who have been selected on the basis of matching their known (registered) capabilities with demanded capabilities.

YOR9-2000-0574US1

2. - One vendor may be able to provide more than one demanded capability as pictorially depicted in Figure 1. Vendor V1 can provide demanded capabilities DC1 and DC12.

Here, the formation of vendor coalitions when one vendor provides more than

5   one demanded capability is a complex problem. In Figure 1, two potential solutions for the coalition formation problem are:

1.   Select V1 to satisfy both DC1 and DC2, and select V5 to satisfy DC3.

2.   Select V1 for DC1, V2 for DC2, and V5 for DC3.

Assuming that these vendors have sufficient capacity to meet the imposed

10   demand, both of the above solutions are feasible. However, the cost associated with them may not be the same. The total cost of solution 1 might be lower because V1 provides a lower price on the combined bid for DC1 and DC2. Also, solution 2 might be delivered quicker because three different vendors who take a smaller amount of time together to satisfy all demanded

15   capabilities. It is immediately apparent that there a combinatorial number of feasible solutions exist for the coalition formation problem, each with an associated cost or duration to deliver. Developing an optimal solution will involve searching the entire space of solutions which can be prohibitive in terms of computation time. Therefore, implicit solution space spanning

20   techniques are developed to solve this decision support problem.

As shown in Figure 2, when incoming RFX (i.e., request for proposal or request for quote) requirements are complex, they can be broken down into smaller sets of requirements. This task is usually performed by a systems integrator 201. The incoming RFX is split into multiple RFXs based on some

25   criteria. The systems integrator 201 generates sub-RFXs, illustrated in Figure 2 by way of example only as sub-RFP1 202_1 and sub-RFP2 202_2, which are then passed on to down stream capability translation, again illustrated in Figure 2 by way of example only as capability translation 203_1 and capability translation 203_2. These translation functions produce demanded

capabilities DC2, DC2, DC3 and DC4, DC5, DC6, respectively. Vendor matchmaking functions 204_1 to 204_6 then generate sets of vendors 205_1 to 205_6 which are passed to the coalition formation processes. In this situation, vendor coalitions are of a hierarchical nature depending on how many RFXs the original RFX generated. In this case, there are two categories of coalitions:

1.   Single-level coalitions that are formed to meet requirements of each parent RFX node in the RFX tree. At each level in the tree, a vendor coalition can be generated that optimally meets the requirements of the parent RFX node.

2.   The overall multi-level coalition for the total project (based on the incoming customer RFX) that incorporates all hierarchies. This essentially is a hierarchical aggregation of all single-level coalitions in step 1.

Multi-level coalition formation in the hierarchical situation can be based on decisions that can be either local or global in scope. When coalitions are formed based on local scope, local information within the current level in the tree is used to optimize the coalition at the current node. Results are then passed back to the parent node. Finally, the multi-level coalition that results is obtained by aggregating the results of the local coalitions at each individual node in the tree.

When vendor coalitions are formed globally, no coalition formation decisions are made at the local level. Based on the vendor selections performed during the matchmaking process, invitations are sent out. Based on the vendor responses received, global optimization may be performed by looking at the entire tree to decide how coalitions will be formed at each level in the tree rather than making decisions at individual nodes and then aggregating the results.

The overall coalition formation process is shown in Figure 3. An RFP

received from a customer at 301 is reviewed by the system integrator 302 at Level (n) for project details, and then the project is decomposed into sub-RFPs at 303. The system illustrated in Figure 3 comprises several databases, templates and tools. Specifically, requirement templates 304 are used to create RFPs for sub-projects 305_1, 305_2 and 305_3. In the process of creating these RFPs, an RFP database 306 is accessed by the system, and for each RFP created, the system determines at 307_1, 307_2 and 307_3 required capabilities and matches vendors to those capabilities by accessing vendor capability database 308. After vendor short lists are prepared at 309_1, 309_2 and 309_3, vendor proposals are solicited at 310_1, 310_2 and 310_3, and the received proposals are stored in proposals database 311. The vendor proposals in database 311 are accessed by the negotiation tool 312 used by the system integrator 302 to negotiate proposals at 313_1, 313_2 and 313_3. Primary and alternate vendors are selected at 314_1, 314_2 and 314_3 using the decision support tool 315. Once the project coalition for a given coalition level is formed at 316, the coalition is stored in the coalition database 317. When the customer accepts the proposal, the system rolls up the coalition at Level (n) to the Level (n − 1) coalition at 318, thereby aggregating it within the larger coalition.

The steps illustrated by numerals within parentheses in Figure 3 are implemented by the system. In step (1), the Vendor (n) receives an RFP from the Customer (n). In step (2), the Vendor (n) reviews the project requirements in the RFP. The Vendor (n) then decomposes the project into sub-projects in step (3), if necessary. The overall structure of project decomposition into sub-projects at each layer is shown in Figure 4.

Referring to Figure 4, the customer project at Level (0) is decomposed into sub-projects 11, 12 and 13 at Level (1). Each of these sub-projects may be further decomposed into further sub-projects at lower levels so, for example, sub-project 11 may be decomposed into sub-projects 111, 112 and 113 and sub-project 13 may be decomposed into sub-projects 131 and 132 at Level 3.

Returning now to Figure 3, in step (4) Vendor (n) creates sub-RFPs based on the Customer (n) RFP, if necessary. Vendor (n) is now Customer (n+1) in the context of a sub-RFP. Note, if Vendor (n) has all the capabilities in-house to satisfy Customer (n) RFP, then there may be no need to create

5   sub-RFPs. In some instances, even if Vendor (n) lacks certain capabilities, the Vendor (n) may choose to go outside the system to get services, essentially forming private coalitions in response to the Customer (n) RFP. This represented in step 3a in Figure 3. The process of splitting RFPs into sub-RFPs is shown in Figure 5.

10   In Figure 5, the customer RFP (0) is analyzed by the data processing system to determine demanded capabilities. This processing includes requirements translation 501, capability matching 502 and soliciting proposals 503 from vendors. This last step is shown by sending the RFP (0) to a plurality of vendors 504_1, 504_2 and 504_3.

15   Again with reference to Figure 3, The system determines in step (5) the capabilities required to satisfy sub-RFP requirements, if sub-RFPs are input to the system. The system matches required capabilities identified with available vendor capabilities. The system then creates in step (6) a vendor shortlist in response to a sub-RFP. The shortlist vendors are designated as

20   belonging to Vendor (n+1) category. The system then invites vendors on the shortlist to review the sub-RFP and provide a proposal in step (7). The entire process of RFP Transmission from the customer to the invited vendors is shown in Figure 6.

Figure 6 shows the initial RFP (0) going to Vendor 1, Vendor 2 and

25   Vendor 3, and each of these vendors splits the RFP (0) into two or more sub-RFPs. Taking Vendor 2 as exemplary, the RFP (0) is split into RFP (21), RFP (22) and RFP (23). Each of these sub-RFPs are submitted to one or more vendors. In the illustration, RFP (21) is submitted to Vendor 211, Vendor 212 and Vendor 213, RFP (22) is submitted to Vendor 221, Vendor 222 and

Vendor 223, and RFP (23) is submitted to Vendor 231, Vendor 232 and
Vendor 233.

Referring back to Figure 3, Customer (n+1) reviews Vendor (n+1)
proposals in step (8). The system facilitates negotiation of the proposal
between Customer (n+1) and each of Vendors (n+1). Then, in step (9), the
customer selects primary and secondary Vendors (n+1) to provide the sub-
RFP solutions as shown in Figure 7.

In the example of Figure 7, Vendor 2 selects Vendor 212 who
responded to sub-RFP (21), Vendor 221 who responded to sub-RFP (22), and
Vendor 231 who responded to sub-RFP (23).

In step (10) Figure 3, Vendor (n), who is also designated as Customer
(n+1), and primary Vendor (n+1) become part of a coalition in support of
Customer (n). This is a Level (n) coalition. Vendor (n+1) may have its own
coalition at Level (n+1). This is rolled up into the Level (n) coalition if
Vendor (n)'s proposal is accepted by the customer. If multiple sub-RFPs are
created by Customer (n+1) (i.e., Vendor (n)), then several Level (n+1)
coalitions may be part of the Level (n) coalition. In step (11), Vendor (n)
provides a proposal to Customer (n) on behalf of the Level (n) coalition as
shown in Figure 8.

In the example shown in Figure 8, Vendor (2) responds to the
Customer on behalf of coalition C2. This coalition comprises Vendor (2) in
combination with Vendor (212), Vendor (221) and Vendor (231), these latter
vendors having been selected in the process illustrated in Figure 7. Likewise,
Vendor (1) responds to the Customer on behalf of coalition C1, and Vendor
(3) responds to the customer in behalf of coalition C3.

It should be noted again that Vendor (n) need not create sub-RFPs and
coalitions as required by the system-supported process in order to create a
proposal for Customer (n). Qualified vendors could create a private coalition,
as shown in step (3a) in Figure 3, in preparation for submitting the proposal. It

is also possible for Vendor (n) to provide the proposal first and then create the Level (n) coalition (either system-supported or private) to deliver the RFP solution unless, of course, the coalition's description is required as part of the proposal.

5   In summary, the invention facilitates a coalition formation process when a customer brings a RFP to the e-marketplace. The system gathers the requirements, analyzes the requirements to determine the capabilities required for the job, and then compares the required capabilities to a vendor capability catalog. A shortlist of potential vendors is generated, and this list may be

10   further refined to account for customer and vendor preferences. Each vendor on the shortlist is invited to prepare a RFP response. Each vendor invited to respond in turn assesses the RFP requirements, identifies the capabilities required, and if necessary decomposes the RFP into a plurality of sub-RFPs. When the RFP is decomposed into one or more sub-RFPs by a vendor, the

15   vendor becomes a customer, and the sub-RFPs are processed in a manner similar to that of the original RFP to generate a shortlist of potential vendors for each of the sub-RFPs. Sub-vendors with all the required capabilities can prepare proposals and the vendor, acting as a customer, can assess the proposals and select one or more sub-vendors to form a coalition. The vendor

20   then presents a proposals to the original customer. The customer receives proposals from a plurality of vendors, who may represent one or more coalitions of vendors, and selects one or more of these to fulfill their requirements. In the context of a project, any organization can simultaneously play one or more roles; i.e., that of a customer, a vendor, or in some cases

25   even a sub-vendor.

     The process supported by the invention has the advantage of repeat business from customers because they receive services from the best team available at the time of their request. The vendors, in turn, are able to respond to customer RFPs that they might not otherwise been able to respond to.

While the invention has been described in terms of a single preferred embodiment, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the appended claims.